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July 9, 2021

Rajinder Sahota, Deputy Executive Officer for  
Climate Change & Research  
California Air Resources Board 1001 I Street  
Sacramento, CA 95814

Comments submitted electronically via [Comment Submittal Form \(ca.gov\)](#)

**RE: Comments Related to the 2022 AB-32 Scoping Plan Update June 2021 Workshops**

Dear Ms. Sahota,

Air Products is pleased to provide comments in support of CARB's 2022 update of the AB-32 Scoping Plan. We understand the significance and the challenges of this update based on the longer planning horizon coupled with the necessary reduction targets post-2030. Air Products has a higher purpose to bring people together to **collaborate** and **innovate** solutions to the world's most significant energy and environmental sustainability challenges. We support CARB's climate goals and believe that Air Products can help California with the energy transition needed to meet these challenges.

Air Products is a world-leading industrial gases company, in operation for over 80 years with operations in more than 50 countries around the globe. The company's core industrial gases business provides atmospheric and process gases and related equipment to manufacturing markets, including refining and petrochemical, metals, electronics, food and beverage and healthcare. Approximately 19,000 employees globally work to make Air Products the world's safest and best performing industrial gases company, providing sustainable offerings and excellent service to all customers.

The company has 9 hydrogen production plants in California and safely operates 35 miles of hydrogen pipelines in California. Worldwide, we are the largest hydrogen producer with over 8,000 metric tonnes per day of hydrogen capacity and over 1,800 miles of industrial gas pipelines safely operating. Lastly, Air Products has designed, installed, and supplies a fleet of hydrogen fueling stations across California, facilitating the transition to carbon-free transportation. In fact, Air Products supplies 80% of the hydrogen currently used in the California mobility market.

In July 2020, Air Products announced a \$5 billion hydrogen project, which will come online in 2025 and provide renewable, carbon-free hydrogen on a global scale. We have additionally committed to investing \$2 billion in fueling infrastructure to bring this fuel to market around the globe to power buses, trucks, and serve other applications. We look forward to bringing a portion of that investment, and hydrogen, to California.

Air Products also recently announced a \$1 billion project in Edmonton, Alberta, in conjunction with the Government of Canada to create a net-zero hydrogen energy complex, deploying an innovative design and advanced technology. The project, which will be on-stream in 2024 will leverage locally sourced natural gas to be processed into hydrogen using an autothermal reformer which allows for over 95% of carbon dioxide (CO<sub>2</sub>) emissions to be more readily captured. The CO<sub>2</sub> will be permanently sequestered resulting in nearly carbon free hydrogen. Not only will the hydrogen be supplied to industrial customers, but it will also be used to generate and export low-carbon power as well as produce low-carbon liquid hydrogen for the transportation market. This innovative design results in a net-zero hydrogen facility.

Hydrogen use as a clean energy alternative in multiple sectors should be a central focus of the Scoping Plan update - not only for reaching carbon neutrality post-2030, but for the advantages it offers now. It has been used historically to reduce harmful emissions from legacy fossil-based transportation fuels. Hydrogen production through traditional methods is also used now to improve carbon intensities of liquid fuels and directly as a zero-emission transportation fuel with fuel cell technology resulting in carbon, criteria, and toxic emission reductions today. When these traditional forms of production are paired with advanced feedstocks and carbon capture and sequestration (CCS), very low and even negative carbon intensity hydrogen can be produced. Beyond transportation, hydrogen has emission reducing applications for electricity generation and hard-to-electrify industrial processes. Many countries have adopted specific hydrogen strategies and are encouraging hydrogen 'hubs' that recognize the benefits hydrogen offers in their net-zero or carbon neutrality plans. We believe that hydrogen is the right focus for California as well.

CARB asked several key questions throughout the workshops. Air Products would like to offer some feedback to these questions.

*What approaches to carbon neutrality exist that are technologically feasible, cost-effective, and have minimal impacts to households and jobs? How quickly can sectors transition?*

Air Products supports policy that encourages carbon reduction through incentives or performance-based and technology-neutral standards. We strongly support the Low Carbon Fuel Standard (LCFS) as a model program in this regard and believe that strengthening it beyond 2030 is paramount to achieving carbon neutrality as the transportation sector is the largest contributor to emissions. At the last LCFS workshop, we provided several suggestions to improve the program to incent and achieve further reductions in transportation fuel carbon intensity.

The most effective policies are those that set climate reduction targets instead of requiring specific technologies. This allows the private sector to meet the targets with the best technology as quickly as possible. Both the LCFS and the Cap & Trade programs are great examples of such programs and will be key to ensure needed emission reductions beyond 2030.

In terms of incentivizing carbon reductions for the hydrogen market, the best policies would set reduction targets, utilize carbon intensity as the measuring stick and then let continuous

improvement occur based on innovation. The use of an artificial hydrogen color nomenclature (green, blue or grey) and then dictating which one can be used in certain applications not only limits technological innovation but, is essentially a technology mandate that does not necessarily yield the best and fastest solutions.

*How can we maximize air quality and public health benefits for vulnerable communities?*

Furthering programs that reduce transportation emissions, especially programs that incent heavy-duty vehicle turnover to zero emission vehicles, is the one of the best ways to reduce emissions in disadvantaged communities. It is well-documented that low-income populations along goods-movement corridors have increased incidents of asthma and upper-respiratory disease as well as a lower-age death rate from those who live further away. That public health issue is, in large part, the result of significant and constant diesel traffic<sup>1</sup>. The faster those vehicles can be transitioned to a zero-emission technology, the faster the health issues will be mitigated. Hydrogen powered heavy duty trucks are available and should be deployed as soon as possible. Similarly, use of hydrogen as a clean burning fuel in power and industrial plants will reduce localized emissions in disadvantaged communities.

*Given potential benefits to electrification, how do we best use RNG and renewable hydrogen, and what are the infrastructure needs to further reduce/replace fossil fuels?*

As mentioned in answers to other questions, the use of hydrogen to reduce transport emissions in fuel cell electric vehicles is a critical component of meeting the state's carbon and emission reduction goals. Our input below will focus on other opportunities for the use of hydrogen.

Air Products believes that providing hydrogen fuel directly (as a blend at first and then 100%) to power plants creates increasingly low-carbon electricity for the growing electrification demand of residential, commercial, and industrial customers. Doing so will also complement the intermittency issues posed by solar and/or wind power. When the sun isn't shining or the wind isn't blowing, hydrogen can be used in power plants for base load assets.

Aside from providing low carbon hydrogen to power production, there is also an important role for hydrogen to play in decarbonizing those industries that require very high heat, for which electrification would be prohibitively expensive (e.g., cement, steel, glass, tile) and that currently use natural gas as their fuel. We encourage CARB to include targets in the scoping plan for hydrogen use in heavy industrial sectors. In these sectors – many of which operate 24/7, it is critical to have high heat AND to have it reliably delivered on a constant basis. Intermittency of renewable electricity combined with battery back-up would not provide a sufficient resource on which those industries could rely costing significant loss in productivity.

For California, Air Products believes that a less effective use of low carbon hydrogen to address environmental concerns is blending it into existing natural gas infrastructure that serves a large diverse network that dilutes the benefits. A thorough review of pipeline material,

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<sup>1</sup> <https://www.epa.gov/air-research/research-near-roadway-and-other-near-source-air-pollution>

upgrade costs, and consumer impacts must be completed to understand the impacts of blending at a level sufficient to realize meaningful reductions – and only then if these impediments can be overcome.

Support for necessary infrastructure to enable projects like the zero-carbon project referenced above, includes offloading facilities at ports, and broad-based educational effort to assure the local public of the significant environmental benefits of delivering clean, renewable energy in a safe and affordable fashion. A strong policy signal that incentivizes private investment in clean technologies, including hydrogen supply and infrastructure, is the best way for CARB and the state to advance their carbon reduction goals. These policies need to provide a level playing field and equal opportunities for low carbon technologies to compete. With the right signals, the private market can build the infrastructure at the scale needed.

Policies that offer financial incentives to produce and deliver clean energy are important. Equally important are policies that maximize the benefits of the environmental attributes of low carbon fuel, including hydrogen. Again, using an artificial color scheme provides an easy-to-understand rubric for the public, but it is far too blunt of a tool to allow for a broad technological advance in this field. For example, there are CCS projects that are labelled “blue”, but which can actually be built with a negative carbon intensity if engineered to use certain renewable feedstock. Calling them by color and limiting access to resources to encourage them based on the color suboptimizes the process to move quickly toward clean energy.

It is equally important to address the issue that limits the incentives of producing low-carbon hydrogen in one place, mixing it with hydrogen from traditional sources and not allow the end-use customer to realize the full benefits of the low-intensity molecules produced and purchased. It will be important for programs like the low carbon fuel standard to allow for the full environmental benefit of low-carbon hydrogen to be realized by the end user even if the lower carbon hydrogen is mixed with higher carbon intensity hydrogen for transport in common pipelines. This can be managed via a ‘book and claim’ methodology already facilitated in the regulation for renewable natural gas.

*What are the environmental/economic tradeoffs of Natural Working Lands actions and how do these actions intersect with other sectors (i.e., electricity/fuels, land-use, etc.)?*

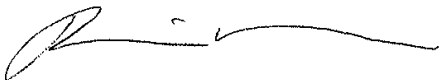
The scoping plan presentations consistently showed a slide illustrating the importance of carbon removal strategies for the state to reach carbon neutrality. Air Products believes that carbon capture and permanent sequestration plays a very important role in this. The emission profile (carbon intensity) of commonly produced hydrogen can be significantly reduced utilizing CCS and if the emissions from hydrogen produced by biomass are sequestered, negative carbon emission can be achieved. Negative carbon emissions are key to reaching carbon neutrality. Low-carbon hydrogen paired with captured CO<sub>2</sub> molecules can create new markets for synthetic methane and other renewable fuels or materials. Deployment of hydrogen produced using CCS concurrently with development of renewable hydrogen opportunities will accelerate carbon reductions in multiple sectors sooner than either technology being exclusively favored.

*Where should we focus public investment to help facilitate the transition to transportation electrification? How do we ensure that low-income residents have equal access to affordable clean vehicles and refueling infrastructure?*

Air Products sees the biggest opportunities for low carbon hydrogen in buses and all applications of heavy-duty vehicles – both on and off-road. We are confident hydrogen mobility will play a critical role in the decarbonization of transportation. Because of its fast-fueling capabilities and vehicles offering longer ranges and larger sizes without a loss in efficiency or capacity, fuel cell electric vehicles offer an essentially one-to-one replacement for gasoline and diesel vehicles. This is especially important for certain vehicle segments that are more costly or less convenient to electrify using batteries, including large and fully functional trucks and SUVs,<sup>2</sup> long haul trucking, rail, and other transit applications – including large bus fleets or transit buses with long or varied routes. As the state looks to transition to 100 percent zero emission vehicles in all applications, it must support an array of zero emission technologies – including fuel cells and hydrogen – to avoid compromise or unnecessary cost for any driver or application.

Air Products appreciates the opportunity to provide this feedback and we would like to meet with CARB to discuss the opportunities we see for hydrogen in the next cycle of scoping plan development and to meet the state's carbon neutrality goals. Please feel free to contact me by phone (916-860-9378) or email [hellermt@airproducts.com](mailto:hellermt@airproducts.com).

Respectfully,



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Director, Greenhouse Gas Government Policy

cc: Cheryl Laskowski- CARB  
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<sup>2</sup> CARB identifies fuel cell vehicles as the lowest cost zero-emission vehicle technology for medium and large SUVs, especially when all-wheel drive, towing, or cold weather packages are included. See, for example, slide 67 from their May 6, 2021 Advanced Clean Cars II Workshop: [https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2\\_workshop\\_slides\\_may062021\\_ac.pdf](https://ww2.arb.ca.gov/sites/default/files/2021-05/acc2_workshop_slides_may062021_ac.pdf)